

Claim 32 (previously presented): A method for making an implement with improved accuracy for measurement or control of a physical quantity by canceling out error due to an interfering noise  $N$  so as to provide an error corrected output  $V_c$ , sensitive to a signal input  $I$ , which includes the steps:

find or construct a sensor with an output  $V$  which has a signal to noise ratio SNR which changes substantially when the condition of an operating parameter  $Q$  is selectively modulated,

provide means whereby said output  $V$  of the said sensor in a higher said SNR state due to a condition of said operating parameter  $Q$  is combined with said output  $V$  of said sensor in a lower said SNR state due to a different said condition of said operating parameter  $Q$ , and

adjust said combined so that the said noise  $N$  mostly cancels but said sensor continues to have a good gain for said signal input  $I$ .

Claim 33 (previously presented): A method as claimed in claim 32, wherein said input  $I$  and said noise  $N$  are conditioned, or generally change by only a small amount during the time duration of one full operating cycle of change of said condition of said operating parameter  $Q$ .

Claim 34 (previously presented): A method as claimed in claim 32, wherein said sensor comprises at least two said sensors or a composite sensor having at least two sectors, and wherein each one of said two sensors or said two sectors operates full time at a different said condition of said operating parameter  $Q$ ,

so that there is thereby no need to have a short operating cycle time and no need to condition said input  $I$  and said noise  $N$  or require that they be generally constant over said one full operating cycle.

10-14-046

Claim 35 (previously presented): A method as claimed in Claim 32 wherein said sensor is a non-contact ammeter which incorporates at least one Hall device associated with a magnetic core SQ.

Claim 36 (previously presented): A method as claimed in Claim 32 wherein said sensor is a non-contact ammeter which incorporates at least one Hall device associated with a magnetic core SQ, and

wherein said operating parameter Q is the magnetic reluctance of said magnetic core SQ.

Claim 37 (previously presented): A method as claimed in claim 32 wherein said sensor is a non-contact ammeter which incorporates a Swain type coupling winding  $N_s$  wound on a core SQ.

Claim 38 (previously presented): A method as claimed in claim 32 wherein said sensor is a non-contact ammeter which incorporates a Swain type sense coupling winding  $N_s$  on a core SQ, and wherein said operating parameter Q is the peak current  $I_{sm}$  in said sense coupling winding  $N_s$ .

Claims 39 - 47 (canceled)

Claim 48 (previously presented): A process for constructing an improved machine having a machine output  $V_c$  for at least one of measuring or controlling a physical quantity I by canceling out an error in said machine output  $V_c$  due to an interfering noise N so as to provide an error corrected machine output  $V_c$  which is sensitive to said physical quantity I, which includes at least the steps: find/construct, and provide; described as follows:

at least one of find or construct a sensor with an output V which has a signal to noise ratio SNR which changes substantially when the condition of an Operating Parameter is selectively modulated; and

provide means whereby said sensor output V in a higher said SNR state due to a condition of said Operating Parameter Q is combined with said sensor output V in a lower said SNR state due to a different said condition of said Operating Parameter Q; and

adjust at least one of said combined, said Operating Parameter Q or said sensor so that the said error due to said noise N mostly cancels at the said machine output  $V_c$ , but

said machine output  $V_c$  is well responsive to said physical quantity I.

Claim 49 (previously presented): A process as claimed in claim 48, wherein said physical quantity I and said noise N during the time duration of one full operating cycle of change of said condition of said operating parameter Q are at least one of: changed by only a small amount naturally, or are so conditioned.

Claim 50 (previously presented): A process as claimed in claim 48, wherein said sensor comprises at least one of: at least two said sensors or a composite sensor having at least two sectors, and wherein each one of said two sensors or said two sectors operates full time at a different said condition of said operating parameter Q,

so that there is thereby no need to have a short operating cycle time and no need to condition said physical quantity I and said noise N or require that they be generally constant over said one full operating cycle.

Claim 51 (previously presented): A process as claimed in Claim 48 wherein said sensor is a non-contact ammeter which incorporates at least one Hall device associated with a magnetic core SQ.

10-14-04 ✓

Claim 52 (previously presented): A process as claimed in Claim 48 wherein said sensor is a non-contact ammeter which incorporates at least one Hall device associated with a magnetic core SQ, and

wherein said operating parameter Q is the magnetic reluctance of said magnetic core SQ.

Claim 53 (previously presented): A process as claimed in claim 48 wherein said sensor is a non-contact ammeter which incorporates a Swain type sense coupling winding  $N_s$  wound on a core SQ.

Claim 54 (previously presented): A process as claimed in claim 48 wherein said sensor is a non-contact ammeter which incorporates a Swain type sense coupling winding  $N_s$  on a core SQ, and wherein said operating parameter Q is at least one of the peak current  $I_{sm}$  or the number of turns in said sense coupling winding  $N_s$ .

Claims 55 - 63 (canceled)

Claim 64 (currently amended): ~~Claim~~ a method for making a more accurate implement for at least one of measurement or control including the steps:

Construct a port for desired input signal I, which of necessity makes a port for undesired error producing interference N,

construct a port for said implement's output  $V_c$ ,

acquire an Essential Characteristic type sensor having an output V responsive to said desired input signal I, and also

responsive to said undesired error producing interference N, and further

having an operating parameter of magnitude Q;

10-14-04 ✓

show that said Essential Characteristic type sensor has a useful said Essential Characteristic evidenced by

a signal to noise ratio SNR of said sensor observed to change a lot when the said magnitude  $Q$  of said operating parameter is modulated over a practical range;

provide said implement equipped to:

support said sensor and ~~at least one of:~~

largely cancel said interference  $N$  but retain a good signal  $I$  at said output  $V_c$  by

suitably modulating said magnitude  $Q$ ,

operating on said sensor output  $V$  and

coupling the result to said output  $V_c$  of said implement in a manner such that

a reduced form of the said sensor output  $V$  in a lower said SNR state is

combined with said sensor output  $V$  in a higher said SNR state so that

said interference  $N$  largely cancels~~✓~~

or;

~~considerably reduce said undesired interference  $N$  relative to said desired signal  $I$  at said output~~

~~$V_c$  by~~

~~holding said magnitude  $Q$  in a higher said SNR state and~~

~~coupling said sensor output  $V$  to said implement output  $V_c$ .~~

Claim 65 (canceled)

Claim 66 (currently amended): ~~I claim~~ a method for making a more accurate sensor with implement for at least one of measurement or control, made in steps:

obtain a said sensor having an output  $V$  responsive to a physical quantity input  $I$ , the gain  $g$  given by

10-14-04 ✓

$$g \equiv \frac{\delta V}{\delta I}, \text{ and}$$

said output V is also responsive to an undesired error producing interference N, the sensitivity  $\Psi$  being

$$\Psi \equiv \frac{\delta V}{\delta N}, \text{ and}$$

in addition, said sensor has an operating parameter of magnitude Q which modulates said  $\Psi$ , and to a lesser extent said gain g;

at least one of calibrate, or make by a proven process, or otherwise assure that said sensor has a strong Essential Characteristic evidenced by observing that said Sensitivity  $\Psi$  changes a lot more than said gain g when said magnitude Q is driven over a practical range of values;

and at least one of:

~~provide an error reducing form of said implement, fitted to support said sensor, and~~

~~also fitted to drive said magnitude Q and hold it at a constant value, and by at least one of measurement or a proven process, set said magnitude Q at a value corresponding to a said sensitivity  $\Psi$  which is a lot less than heretofore while said gain g is still good,~~

~~thus making said sensor with implement substantially more accurate than comparable transducers for said input I in the presence of said interference N.~~

or;

provide an error correction form of said implement having an output  $V_c$ , and

also fitted to support said sensor, and

further equipped with state means

driving said magnitude Q,

10-14-04 ✓

dividing the said output  $V$ , and

combining the said output  $V$ , and

wherein said combining is coupled to said implement output  $V_c$ ;

construct the said state means so that there is at least one state "A" wherein

said means drive said magnitude  $Q$  to produce a large said sensitivity  $\Psi$  with good said gain  $g$ ,  
and also said sensor output  $V$  is largely said divided and made available for said combining;

further construct said state means so that there is also at least one state "B" wherein

said means drive said magnitude  $Q$  to produce a small said sensitivity  $\Psi$  with good said gain  $g$ ,  
and

also said sensor output  $V$  is but slightly said divided and made available for said combining;

to get said error correction, at least one of:

set by a proven process, or adjust at least one of a said means dividing or said means combining  
so that

the said largely divided said large  $\Psi$  of said state "A" is about equal to and opposite from the said  
but slightly divided said small  $\Psi$  of said state "B", and

thereby the said  $\Psi$ 's approximately cancel in said combiner so that

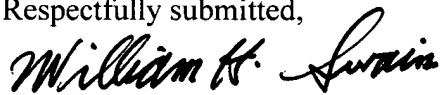
the said error producing interference  $N$  is mostly removed from said output  $V_c$ ; and

10-14-09 ✓

notwithstanding there is remaining at said  $V_c$  a large part of said responsiveness to said physical quantity input I;

so that thereby said sensor with implement is a whole lot more accurate than comparable transducers for said physical quantity input I in the presence of said interference N.

Respectfully submitted,

A handwritten signature in cursive script, reading "William H. Swain".

William H. Swain

Inventor

10-14-04

-18-